

Ameritech ("Ameritech"):

Subscribers: 200,000

Owners: Ameritech 100%

Control: Ameritech 100%

Armstrong ("Armstrong"):

Subscribers: 203,627

Owners: Armstrong 100%

Control: Armstrong 100%

AT&T Owned & Operated Systems ("AT&T"):

Subscribers: 10,670,000

*Subs2:*¹¹⁰ 9,935,000

Owners: AT&T 100%

Control: AT&T 100%

Bresnan Communications Co. Ltd. Partnership ("Bresnan"):

Subscribers: 640,000

Owners: AT&T 50%, Blackstone Entities 39.4%, BCI 9.6%, William J. Bresnan
1%

Control: AT&T 50%, Blackstone Entities 39.4%, BCI 9.6%, William J. Bresnan
1%

¹¹⁰ AT&T sells 735,000 subscribers to Comcast after the merger.

Cable One ("CableOne"):

Subscribers: 735,000

Owners: Cable One 100%

Control: Cable One 100%

Cablevision Associates of Gary Joint Venture ("CAGJV"):

Subscribers: 18,000

Owners: AT&T 90%, Zarin Libauer Cablevision 10%

Control: AT&T 90%, Zarin Libauer Cablevision 10%

Cablevision Systems Corporation ("Cablevision"):

Subscribers: 3,419,000

*Owners:*¹¹¹ AT&T 33%, Cablevision 67%

Control: Cablevision 100%

¹¹¹ AT&T has a 33% ownership interest in Cablevision. AT&T has an 8.9% voting interest in Cablevision, but the board of directors is largely controlled by members of the Dolan family; thus, AT&T's interest is treated as silent.

CAT Partnership ("CAT"):

Subscribers: 39,000

*Owners:*¹¹² AT&T 33.333%, KBL Communications 16.667%, Comcast 33.333%,
Time Warner 11.297875953%, Liberty 1.117372347%, MediaOne
4.2517517%

Control: AT&T 33.333%, KBL Communications 16.667%, Comcast 33.333%,
Time Warner 12.4152483%, MediaOne 4.2517517%

*Control2:*¹¹³ AT&T 33.333%, KBL Communications 16.667%, Comcast 33.333%,
Time Warner 16.667%

Charter ("Charter"):

Subscribers: 3,900,000

Owners: Charter 100%

Control: Charter 100%

Classic ("Classic"):

Subscribers: 360,000

Owners: Classic 100%

Control: Classic 100%

¹¹² Time Warner Entertainment owns 16.667% of CAT. Time Warner Entertainment is owned by Time Warner (74.49%) and MediaOne (25.51%). Liberty has a 9% silent financial interest in Time Warner.

¹¹³ MediaOne's ownership interest in Time Warner Entertainment is assumed to be silent post-merger in this control scenario.

Comcast ("Comcast"):

Subscribers: 5,351,600

*Subs2:*¹¹⁴ 6,086,600

Owners: Comcast 100%

Control: Comcast 100%

Cox ("Cox"):

Subscribers: 5,140,000

Owners: Cox 100%

Control: Cox 100%

DirecTV ("DirecTV"):

Subscribers: 7,424,000

Owners: DirecTV 100%

Control: DirecTV 100%

District Cablevision Limited Partnership ("District"):

Subscribers: 110,000

Owners: AT&T 75%, District Cablevision 25%

Control: AT&T 75%, District Cablevision 25%

¹¹⁴ Comcast purchases 735,000 subscribers from AT&T after the merger.

EchoStar ("EchoStar"):

Subscribers: 2,492,000

Owners: EchoStar 100%

Control: EchoStar 100%

Falcon Communications, L.P. ("Falcon"):

Subscribers: 995,000

Owners: AT&T 45.9474%, Falcon 54.0526%

Control: AT&T 45.9474%, Falcon 54.0526%

Fanch ("Fanch"):

Subscribers: 503,000

Owners: Fanch 100%

Control: Fanch 100%

Galaxy ("Galaxy"):

Subscribers: 170,000

Owners: Galaxy 100%

Control: Galaxy 100%

Insight ("Insight"):

Subscribers: 726,612

Owners: Insight 100%

Control: Insight 100%

Insight Communications of Indiana, LLC ("InsightIN"):

Subscribers: 319,000

Owners: AT&T 50%, Insight Communications 50%

Control: AT&T 50%, Insight Communications 50%

InterMedia Capital Partners IV, L.P. ("InterMediaCP"):

Subscribers: 595,000

Owners: AT&T 44.58%, Institutional InterMedia Investors 48.933%, InterMedia
2.701%, Other InterMedia Owners 3.786%

Control: AT&T 44.58%, Other InterMedia Investors 48.933%, InterMedia
2.701%, Other InterMedia Owners 3.786%

InterMedia Capital Partners VI, L.P. ("InterMediaCP2"):

Subscribers: 424,000

Owners: AT&T 49.005%, InterMedia 1%, Leo J. Hindery .495%, Blackstone
49.5%

Control: AT&T 49.005%, InterMedia 1%, Leo J. Hindery .495%, Blackstone
49.5%

InterMedia Partners ("InterMediaP"):

Subscribers: 141,000

Owners: AT&T 97.981%, InterMedia 2.019%

Control: AT&T 97.981%, InterMedia 2.019%

Jones ("Jones"):

Subscribers: 1,007,000

Owners: Jones 63%, Comcast 37%

Control: Jones 53%, Comcast 47%

Kansas City Cable Partners ("Kansas"):

Subscribers: 307,000

*Owners:*¹¹⁵ AT&T 50%, Liberty 3.35205%, MediaOne 12.755%, Time Warner
33.89295%

Control: AT&T 50%, MediaOne 12.755%, Time Warner 37.245%

*Control:*¹¹⁶ AT&T 50%, Time Warner 50%

The Lenfest Group ("Lenfest"):

Systems: Lenfest Communications, Inc., Clearview Partners, Garden State
Cable TV, Raystay Co., Susquehanna

Subscribers: 1,466,000

Owners: AT&T 50%, Lenfest 50%

Control: AT&T 50%, Lenfest 50%

¹¹⁵ Time Warner Entertainment owns 50% of Kansas City Cable. Time Warner Entertainment is owned by Time Warner (74.49%) and MediaOne (25.51%). Liberty has a 9% silent financial interest in Time Warner.

¹¹⁶ MediaOne's ownership interest in Time Warner Entertainment is assumed to be silent post-merger in this control scenario.

Mediacom ("Mediacom"):

Subscribers: 725,000

Owners: Mediacom 100%

Control: Mediacom 100%

MediaOne ("MediaOne"):

Subscribers: 4,970,000

Owners: MediaOne 100%

Control: MediaOne 100%

Mile Hi Cable Partners, L.P. ("MileHi"):

Subscribers: 113,000

Owners: AT&T 78%, P&B Johnson Corp. 21%, Daniels Communications 1%

Control: AT&T 78%, P&B Johnson Corp. 21%, Daniels Communications 1%

Multimedia ("Multimedia"):

Subscribers: 515,506

Owners: Multimedia 100%

Control: Multimedia 100%

Northland ("Northland"):

Subscribers: 271,744

Owners: Northland 100%

Control: Northland 100%

Parnassos Communications, L.P. ("Parnassos"):

Subscribers: 475,000

Owners: AT&T 33.33%, Adelphia 66.57%, Montgomery Cablevision, Inc. .1%

Control: AT&T 33.33%, Adelphia 66.57%, Montgomery Cablevision, Inc. .1%

Peak Cablevision, LLC ("Peak"):

Subscribers: 113,000

Owners: AT&T 66.667%, Fisher Communications 33.333%

Control: AT&T 66.667%, Fisher Communications 33.333%

Prime Cable ("Prime"):

Subscribers: 546,000

Owners: Prime Cable 100%

Control: Prime Cable 100%

RCN Corp. ("RCN"):

Subscribers: 269,421

Owners: RCN 60%, Level 3 Communications 40%

Control: RCN 60%, Level 3 Communications 40%

Service Electric ("SE"):

Subscribers: 293,500

Owners: Service Electric 100%

Control: Service Electric 100%

South Chicago Cable, Inc. ("Chicago"):

Subscribers: 220,000

Owners: AT&T 90%, Other South Chicago Owners 10%

Control: AT&T 90%, Other South Chicago Owners 10%

Sioux Falls ("Sioux"):

Subscribers: 65,000

Owners: AT&T 50%, Midco 50%

Control: AT&T 50%, Midco 50%

TCA Cable Partners II ("TCA"):

Subscribers: 308,000

Owners: AT&T 20%, TCA Holdings 80%

Control: AT&T 20%, TCA Holdings 80%

Tele-Communications of South Suburbia, Inc. ("Suburbia"):

Subscribers: 8,000

Owners: AT&T 80%, John L. Cifelli 20%

Control: AT&T 80%, John L. Cifelli 20%

Texas Cable Partners, L.P. ("Texas"):

Subscribers: 1,109,000

*Owners:*¹¹⁷ AT&T 50%, Liberty 2.2576284%, MediaOne 8.26524%, Time Warner 22.8271316%, Advance/Newhouse 16.65%

Control: AT&T 50%, MediaOne 8.26524%, Time Warner 25.08476%, Advance/Newhouse 16.65%

*Control2:*¹¹⁸ AT&T 50%, Time Warner 33.35%, Advance/Newhouse 16.65%

Time Warner Entertainment ("TWE"):

Subscribers: 4,193,000

*Owners:*¹¹⁹ Liberty 6.7041%, MediaOne 25.51%, Time Warner 67.7859%

Control: MediaOne 25.51%, Time Warner 74.49%

*Control2:*¹²⁰ Time Warner 100%

¹¹⁷ Texas Cable Partners is 50% owned by TWE-AN. TWE-AN is owned by Time Warner Entertainment (64.8%), Advance/Newhouse (33.3%), and Time Warner (1.9%). Time Warner Entertainment is owned by Time Warner (74.49%) and MediaOne (25.51%). Liberty has a 9% silent financial interest in Time Warner.

¹¹⁸ MediaOne's ownership interest in Time Warner Entertainment is assumed to be silent post-merger in this control scenario.

¹¹⁹ The TWE Group is owned by Time Warner (74.49%) and MediaOne (25.51%). Liberty has a 9% silent financial interest in Time Warner.

¹²⁰ MediaOne's ownership interest in Time Warner Entertainment is assumed to be silent post-merger in this control scenario.

The Time Warner Entertainment-Advance/Newhouse Group ("TWE-AN"):

Subscribers: 5,191,000

*Owners:*¹²¹ Liberty 4.5152568%, MediaOne 16.53048%, Time Warner
45.6542632%, Advance/Newhouse 33.3%

Control: MediaOne 16.53048%, Time Warner 50.16952%, Advance/Newhouse
33.3%

*Control2:*¹²² Time Warner 66.7%, Advance/Newhouse 33.3%

TWI Cable Incorporated ("TWI"):

Subscribers: 1,800,000

*Owners:*¹²³ Time Warner 91%, Liberty 9%

Control: Time Warner 100%

United Cable Television of Baltimore Limited Partnership ("United"):

Subscribers: 110,000

Owners: AT&T 83.878%, Universal Telecom 3.087%, Clarence Elder and
Family 13.125%

Control: AT&T 83.878%, Universal Telecom 3.087%, Clarence Elder and
Family 13.125%

¹²¹ Time Warner Entertainment owns 64.8% of the TWE cable systems group. Time Warner Entertainment is owned by Time Warner (74.49%) and MediaOne (25.51%). Time Warner owns 1.9% of the TWE cable systems group directly. Liberty has a 9% silent financial interest in Time Warner.

¹²² MediaOne's ownership interest in Time Warner Entertainment is assumed to be silent post-merger in this control scenario.

¹²³ TWI is owned 100% by Time Warner. Liberty has a 9% silent financial interest in Time Warner.

US Cable of Coastal-Texas, L.P. ("CoastlTX"):

Subscribers: 135,000

Owners: AT&T 37.06%, US Cable 62.94%

Control: AT&T 37.06%, US Cable 62.94%

C.2 AT&T Fully Owns and Controls Liberty

This case is identical to the MSO ownership shares outlined in section C.1, except that any ownership or control share previously attributable to Liberty is now attributed to AT&T. In the event that AT&T and Liberty are both owners of a cable system, the combined share is simply the sum of the individual shares.

C.3 AT&T-MediaOne Post-Merger

After the merger, AT&T and MediaOne's ownership and control shares, outlined in sections C.1 and C.2, are summed to find combined shares for the newly formed company. In one of the scenarios considered in our report, post-merger assumptions about control remain the same as pre-merger assumptions. In this case, the post-merger control shares of AT&T-MediaOne are determined by summing their pre-merger control shares as given under "*Control*." In another scenario, we assume that MediaOne's interest in TWE becomes silent after the merger. In this case, the post-merger control shares of AT&T-MediaOne are determined by summing the control shares given under "*Control2*". (These shares are reported in section C.1 only when they differ from those given under "*Control*".) In a third scenario, we take account of the sale of AT&T subscribers to Comcast after the merger. We assume that the subscribers sold come entirely out of AT&T's owned and operated systems. In this case, the post-merger subscribers are given

under “*Subs2*”. (These totals are reported in section C.1 only when they differ from those give under “*Subscribers*.”)

Appendix D

EMPIRICAL EVIDENCE ON VERTICAL FORECLOSURE

Appendix D

Empirical Evidence on Vertical Foreclosure

D.1 Comparisons of Average Carriage Behavior

The earliest approach taken in comparing carriage rates between vertically integrated and non-integrated cable operators was to calculate, for a particular program service, the average carriage rates of some combination of: (a) systems that were affiliated with the service; (b) systems that were affiliated with other services, perhaps services that were rivals to the service in question; and (c) systems that were not affiliated with any program service. In some studies, (a) and (b) were calculated separately for different MSOs. Some studies also reported average carriage rates for a collection of services. These studies all shared the characteristic that vertical integration was the only factor used to “explain” differences in carriage behavior, i.e., other factors were not “held constant.”

U.S. Department of Commerce, Video Program Distribution and Cable Television: Current Policy Issues and Recommendations, NTIA Report 88-233, June 1988

This study analyzed a sample of 901 cable systems drawn from the 1986 *Television and Cable Factbook*. It first compared the percentage of systems of a vertically integrated MSO that carried an affiliated service to the percentage of non-affiliated systems that carried the same service. In 11 out of 13 cases, the affiliated cable system had a higher carriage rate for its own service than did non-affiliated MSOs. However, while the differences in carriage rates were sometimes statistically significant, and large in absolute terms, the quantitative impact of the

"favoritism" tended to be quite small.¹²⁴ For example, although ATC carried its then-owned USA Network on 97% of its systems, while unaffiliated cable operators carried the service on 68% of their systems, because ATC accounted for only about 6.75% of all cable subscribers, the extent of the ATC advantage for the USA Network amounted to only 2% of all cable subscribers.

In examining bias against unaffiliated services, pay services were distinguished from basic services. Carriage of an unaffiliated service by a vertically integrated MSO, e.g., Viacom's carriage of HBO or Cinemax, was compared to carriage by unintegrated operators.¹²⁵ In 1986, four MSOs — ATC, Viacom, Group W Systems, and Cablevision — had ownership interests in pay services.¹²⁶ Of the 32 instances where an integrated operator might carry a non-affiliated pay service, 17 services were carried by a greater percentage of the integrated systems than by unaffiliated systems.¹²⁷ Of the 15 cases where the unaffiliated pay service was carried less often by an integrated MSO, only one was statistically significant at the 1% level (and that involved the Playboy service, which may be a special case), and one was significant at the 5% level (ATC's carriage of TMC). Thus, this evidence is

¹²⁴ Simple t-tests were conducted to determine whether differences in carriage rates were significant. Differences were significant at the 5% level for eleven cases and, of these, ten were significant at the 1% level. In examining carriage rates by non-affiliated systems, no distinction was made between those non-affiliated systems that were integrated with another service and those systems that were not integrated with any service.

¹²⁵ It appears that unintegrated systems in this study were those that were not integrated with any program services (either pay or basic). However, the description by the authors is unclear.

¹²⁶ Salinger argued that Cablevision and Group W should be considered separately from ATC and Viacom, because the services they owned were qualitatively different from those owned by ATC and Viacom. Michael Salinger, "Public Policy toward Vertical Integration in Cable" (mimeo, October 1990).

¹²⁷ Six of the differences were statistically significant at the 1% level and two were statistically significant at the 5% level.

not consistent with the general view that integrated MSOs are biased against non-affiliated pay services.

Of 68 cases involving basic services, the paper reports that 16 unaffiliated services were carried significantly more often and 12 unaffiliated services were carried significantly less often by integrated operators than by unintegrated operators.¹²⁸ The evidence on "foreclosure" is, based on these findings, decidedly mixed. ATC and Telecable systems had generally higher carriage rates, while Hearst and TCI had generally lower carriage rates of unaffiliated services than did unintegrated systems.

At first glance, some of the differences in carriage rates may appear to be substantial. In particular, the percentage of TCI systems that carried five services (A&E, CNN, ESPN, Nickelodeon, and TWC) was nearly 30 percentage points less than that for unintegrated systems.¹²⁹ However, since TCI accounted for only about 10% of all cable subscribers in 1986, the effect of TCI's behavior was to "foreclose" only about 3% of all cable subscribers.¹³⁰

Klein, B., "The Competitive Consequences of Vertical Integration in the Cable Industry," mimeo, June 1989.

This study employed a random sample of 400 U.S. cable systems stratified by the size distribution (in terms of subscribers) of all cable systems. Data were drawn from the 1988 *Television and Cable Factbook*. Klein first examined the carriage of the 28 most popular services to determine if these services were more

¹²⁸ Statistical significance was determined at the 1% level.

¹²⁹ For example, 40.6% of TCI systems and 68.4% of unintegrated systems carried CNN.

¹³⁰ This calculation assumes that the TCI systems that did not carry a service had on average as many subscribers as those that did carry the service.

likely to be carried by cable systems with ownership interests than by other cable systems. He found that on average integrated operators carried their own service on 15.3% more systems than did operators without ownership ties to the service.¹³¹

Although some affiliated services were carried much more frequently by the owner-cable systems, the magnitude of the carriage advantage was generally quite small. For example, Cablevision carried Bravo on 100% of its systems, while the carriage rate for other systems was only 17.2%. Because Cablevision accounted for only 2.3% of all cable subscribers at the time of the Klein study, however, the advantage afforded Bravo by Cablevision's carriage amounted to only about 2% of all cable subscribers. In addition, Klein found evidence consistent with the proposition that vertical integration reduces costs. Vertically integrated systems carried 8.1% more basic services and 28.4% more pay services.¹³²

To examine whether there was any bias against non-owned services by vertically integrated MSOs, Klein compared carriage by cable systems linked to the four integrated MSOs (ATC, Cablevision, Viacom, and TCI) of unaffiliated services to carriage of the same services by systems not integrated with any services. He found that, for 13 of the 19 basic services he analyzed, systems having an affiliation with some program service were more likely to carry a service with which they were not affiliated than were unintegrated systems. For three of the remaining services (VH-1, TNN, and Nickelodeon), the differences in carriage percentages were no more than about seven percentage points.¹³³ For example, 62.3% of integrated

¹³¹ The difference was statistically significant at the 2% level.

¹³² Statistical significance was not reported.

¹³³ There was no difference in carriage percentages for the remaining three services.

systems and 69.3% of the unintegrated systems carried VH-1. If TCI were "foreclosing" each of these services to the extent found by Klein, each of these services would be "denied access" to less than 2% of all cable subscribers as a result of TCI's behavior.

Klein also found that, on average, vertically integrated MSOs carried an unaffiliated service on 5.1% more systems than did operators that are not integrated with any services¹³⁴ Integrated operators carried unaffiliated basic services 4.8% more and unaffiliated pay services 5.6% more than did unintegrated systems.¹³⁵ Thus, there was no apparent bias by integrated MSOs against unaffiliated services.

CRA Study of TCI Carriage Behavior, 1996.

We performed a similar carriage analysis for TCI systems. When we compared penetration rates on TCI owned and operated systems with penetration rates on all non-TCI systems, we found that the extent of carriage on TCI systems is less for all services, owned or otherwise. For services in which TCI has an ownership interest, the average penetration rate on TCI systems was 6 percentage points less than that on non-TCI systems. For services in which TCI has no ownership interest, the average penetration rate on TCI systems was about 3 percentage points less than that for non-TCI systems. Thus, these data suggest that relative to its owned services, TCI favors unaffiliated services.

¹³⁴ The difference was statistically significant at the 1% level.

¹³⁵ In reviewing this study, Salinger argues that TCI and Cablevision (who both had interests in AMC) should not be included in the same group of operators as ATC and Viacom. Michael Salinger, "Public Policy toward Vertical Integration in Cable" (mimeo, 1990).

We also examined whether a higher ownership share leads to a larger difference between TCI's penetration rate and that of non-TCI systems. That is, if the extent of "favoritism" within the set of TCI's affiliated services increased with TCI's ownership share, one would expect a positive correlation between TCI's ownership share and the penetration rate difference. In fact, the correlation was virtually zero and statistically insignificant.

Even with respect to the carriage of unaffiliated services, TCI's lower carriage rates typically result in only a small percentage (.49%) of the subscriber universe being "foreclosed" to the unaffiliated services. In addition, the number of TCI's subscribers "foreclosed" to the unaffiliated service typically accounts for a very small proportion (1.1%) of the total subscribers to the unaffiliated services. Of course, some services do experience larger shortfalls than other services, most notably, Sci-Fi Channel, Home & Garden TV, and the History Channel.

Home & Garden TV and the History Channel were relatively new services during the time period covered by the data; thus, the lower penetration for TCI may be an artifact of the newness of these services.

D.2 Statistical Analyses of Carriage Behavior

In addition to the studies that compare the average carriage behavior of vertically integrated and unintegrated cable operators, a number of studies have conducted statistical analyses of carriage behavior in which factors other than the existence of vertical integration are taken into account. This section describes these studies.

Salinger, M., "A Test of Successive Monopoly and Foreclosure Effects: Vertical Integration Between Cable Systems and Pay Services," mimeo, 1988.

This study used data from the 1987 *Television and Cable Factbook*.

Observations for systems owned by the largest 20 MSO (256 observations) were selected to include systems in proportion to the number of subscribers and to provide coverage across states. Included in the estimation equations were variables that control for the number of homes passed, the ranking of the TV market, the year the franchise was awarded, and homes passed per mile of cable (density).

A separate probit equation was estimated for the provision of each pay service (HBO, Cinemax, Showtime, and The Movie Channel (TMC)). Each equation included observations for the integrated cable systems, systems owned by the MSO integrated with a rival service, and systems unintegrated with any pay movie services. Salinger found that ATC was more likely to offer Cinemax and less likely to offer TMC than non-integrated systems. ATC carried Showtime as frequently as unintegrated systems. Salinger also found that Viacom was more likely to offer Showtime and less likely to offer HBO and Cinemax.¹³⁶ Without access to the Salinger data, it is impossible to determine how large these tendencies are.

¹³⁶ ATC systems all carried HBO and almost all Viacom systems carried TMC. All statistical tests were based on statistical significance at the 5% level. Note that each estimation equation included a dummy variable indicating whether the cable system was owned by ATC and a dummy variable indicating whether Viacom owned the system. Separate statistical tests were conducted on the coefficients of each of dummy variables, so that they implicitly tested whether the effect of ownership by a particular integrated MSO (either ATC or Viacom) was significantly different from the effect of cable systems not owned by either ATC or Viacom. Salinger did not test whether carriage of a service by affiliated systems was significantly different from carriage of the service by the systems of its integrated rival.

Salinger also examined whether vertically integrated cable systems charged subscriber prices that are different from those charged by other systems. He found that ATC charged lower basic rates — and Viacom charged higher rates — than other systems. In addition, Salinger found that both operators were less likely to offer three or four premium services than were other systems. As with the carriage results, it is not possible to determine how large these tendencies were.

Crandall, R., "Vertical Integration and q-Ratios in the Cable Industry," mimeo, 1990.

Crandall estimated separate probit equations for each of the 24 basic cable services, of which TCI had an interest in nine. The data were taken from the 1989 *Television and Cable Factbook* and were for 2766 systems, including 2175 systems with no vertical integration into program services and 591 owned or partially owned TCI systems. A wide variety of demographic factors and, characteristics of the system were taken into account. The sample of TCI systems was divided into those owned and operated by TCI (361 systems), those with a majority TCI share and not managed by TCI (189 systems), and those with a minority TCI share and not managed by TCI (41 systems).

For majority owned and operated TCI systems, Crandall found that TCI systems were significantly more likely than other systems to carry eight of the nine services in which TCI had an ownership interest,¹³⁷ but also was significantly more likely to carry seven of the fifteen services with no TCI ownership interest. TCI was significantly less likely to carry only FNN, TLC, and WGN (based on statistical

¹³⁷ Because Crandall reported only the coefficients of the vertical integration variables, we could not use his results to estimate the economic importance of the foreclosure he observed.

significance at the 5% level). For the non-managed systems that were majority owned and non-managed systems that were minority owned, TCI also did not consistently discriminate against non-owned services compared to unintegrated systems. Crandall concluded that, overall, TCI systems exhibited no tendency to discriminate against other services, and that the choice of carriage depended on the extent of ownership interest by TCI and whether TCI manages a system.¹³⁸

D. Waterman and A.A. Weiss, "The effects of vertical integration between cable television systems and pay cable networks," *Journal of Econometrics* 72 (1996) 357-395.¹³⁹

Waterman and Weiss (W-W) compared the carriage of integrated and rival pay networks by Time Warner and Viacom cable systems to that of nonintegrated cable operators using data for 1646 cable systems owned by the 25 largest cable operators. They concluded that vertically integrated systems carry their own pay networks more frequently and rival networks less frequently than do nonintegrated systems. They also concluded that integrated systems favor their affiliated pay networks with respect to pricing and other marketing behavior.

The approach taken by Waterman and Weiss was to estimate reduced form equations for 12 pay network variables, representing the carriage, price, and

¹³⁸ Crandall also found that TCI's majority-but-not-managed systems carried 2.4 more basic networks and its owned and operated systems carried 3.5 more basic networks than non-vertically integrated systems.

¹³⁹ It should be noted that several papers on the same subject preceded this paper and, at times, the same data, that were apparently never published. These earlier papers include "Vertical Integration of Cable Television Systems with Pay Cable Networks: An Empirical Analysis," Presented at the Airlie House Conference on Telecommunications Policy, October 1-3, 1989; "The Effects of Vertical Integration of Cable Television Systems with Pay Cable Networks: Viacom and Time, Inc. in 1988-89," February 1990; "The Effects of Vertical Integration Between Pay Cable Networks and Cable Television Systems," July 1992; and "Vertical Integration in Cable Television," paper prepared for the American Enterprise Institute, September 17, 1993. The results in this paper, although not a detailed description of the methodology, also appear in Chapter 6 of the authors' Vertical Integration

subscription of each of the four pay movie networks owned by Time Warner and Viacom, i.e., HBO, Cinemax, Showtime, and the Movie Channel. In each case, the focus was on differences between the behavior of cable systems that were jointly owned with a particular network and those that were not.¹⁴⁰ Carriage was analyzed using probit models, which estimate the probability that a particular type of cable system will carry a particular pay network.¹⁴¹ Price and subscription were estimated using tobit models, which estimate the probability that a system will carry a network and, if it does, what the price of and subscription to the network will be on that system. W-W also estimated equations for the total number of the four pay movie networks and the total number of all pay networks carried.

In order to reduce the large number of explanatory variables, and thus to reduce the magnitude of the standard errors of the estimated coefficients, W-W used a model selection algorithm in preference to the elimination of explanatory variables through hypothesis testing. In the approach taken, "the essential feature of the algorithm is that at each step, the variable with the lowest t-ratio is excluded from the model" (p. 366). The authors pointed out, however, that "relatively little is known about the finite-sample properties of such model selection procedures" (p. 367).

in *Cable Television*, Cambridge, MA: MIT Press, 1997, which also provides results for basic and hybrid networks.

¹⁴⁰ According to the paper, Time Warner held an 82% interest in cable system owner ATC and a 50% interest in cable system owner Paragon in 1989. Most of the paper's conclusions regarding the effects of vertical integration on carriage behavior by Time Warner systems were based on results for ATC.

¹⁴¹ The authors explicitly rejected the use of a multinomial logit model in which equations would be estimated for the probability that a particular cable system would carry each of the 16 possible combinations of the 4 networks.